

## HUMAN RESOURCES FOR TREATING NEW CANCER CASES IN BOLIVIA

### Executive Summary

The purpose of this report is to describe the human resources needed in Bolivia to treat new cancer patients.

The population of Bolivia is approximately 9.69 million (4.83 million men and 4.86 million women) and the estimated number of new cancer cases in Bolivia for the year 2008, based on Globocan data for Bolivia as a whole (<http://globocan.iarc.fr/>) was 8689 (3284 in men and 5405 in women) (Table A). The five most common cancers in Bolivia are (1) gynecological (cervix uteri, corpus uteri and ovary), (2) urological (bladder, kidney, prostate and testis), (3) stomach, (4) breast and (5) hematological malignancies (leukemia, Hodgkin lymphoma, Non-Hodgkin lymphoma, multiple myeloma).

Table A: The five most frequently occurring cancers in Bolivia for men and women based on 2008 Globocan data (<http://globocan.iarc.fr/>).

Cancer	Both	Rank	Men	Rank	Women	Rank
All cancers excl. non-melanoma skin cancer	8689		3284		5405	
Gynecological	2690	1			2690	1
Urological	1044	2	949	1	95	10
Stomach	919	3	466	2	453	3
Breast	896	4			896	2
Hematological Malignancies	748	5	435	3	313	6
Gallbladder	502	6	166	6	336	4
Head and Neck	462	7	137	7	325	5
Colorectal	440	8	199	5	241	7
Lung	394	9	207	4	187	8

Newly diagnosed cancer patients need pathology, surgery, chemotherapy and/or radiation therapy. The number of oncologists needed is based, therefore, on the number of patients requiring pathology, surgery, chemotherapy and radiation therapy (Table B). This number is estimated from the percentage of patients requiring surgery, chemotherapy and/or radiation therapy for the top ten cancers in both men and women. For developing countries the International Atomic Energy Agency (IAEA) recommends training radiation/clinical oncologists who can prescribe both radiation and chemotherapy for the common solid cancers, instead of separate medical and radiation oncologists. Hematological malignancies are treated primarily by hematologist-oncologists. The number of specialists needed is based upon the number of cancer patients but each city, in order to ensure coverage if one person leaves or goes on vacation, must have at least 2 surgical oncologists, 2 radiation/clinical oncologists, 2 hematologist oncologists, etc.

Table B: Number of Oncologists needed for Bolivia's two most populous cities based on 2010 population estimates (<http://citypopulation.de/>) and 2008 Globocan data for new cancer cases (<http://globocan.iarc.fr/>).

	New Cancer Cases	Hematologist Oncologists	Surgical Oncologists	Radiation / Clinical Oncologists	Urologic Oncologists	Gynecologic Oncologists	Pathologists
<b>Santa Cruz</b>	<b>1449</b>	2 <sup>†</sup>	2	8	2 <sup>†</sup>	2	3
<b>El Alto</b>	<b>855</b>	2 <sup>†</sup>	2 <sup>†</sup>	5	2 <sup>†</sup>	2 <sup>†</sup>	2

<sup>†</sup>At least 2 are needed in each city.

In addition to oncologists, support staff such as onco-pharmacists, pharmacy technicians, oncology nurses and palliative care specialists is also needed. Many cancer patients require hospitalization for diagnosis, treatment and/or complications, therefore an adequate number of oncology beds will be needed. The number of oncology nurses, onco-pharmacists and pharmacy technicians needed is based upon the number of beds occupied daily by cancer patients while the number of palliative care specialists is based on the number of new cancer cases per year (Table C). The oncology nursing staff for each 24-bed oncology unit (operating 24 hours a day, 7 days a week) comprises of one head nurse and a nurse specialist as well as 13 nurses working 8 hour shifts, 5 days per week.

Table C: Number of Oncology Units, Nursing and Pharmacy Staff needed for Bolivia's two most populous cities based on 2010 population estimates (<http://citypopulation.de/>) and 2008 Globocan data for new cancer cases (<http://globocan.iarc.fr/>).

	New Cancer Cases	Oncology Beds/Day	24 bed Oncology Wards	Onco-Pharmacists	Pharmacy Technicians	Palliative Care Specialists	Oncology Ward Nurses
<b>Santa Cruz</b>	<b>1449</b>	25	2	8	12	3	30
<b>El Alto</b>	<b>855</b>	15	1	4	6	2	15

Since many cancer patients require radiotherapy, appropriately equipped facilities will be needed along with radiation oncology staff (Tables D and E). Radiation oncology staff includes radiation therapy technicians, medical physicists, Linac engineers and radiation oncology nurses in addition to radiation/clinical oncologists. The minimum radiation therapy equipment requirements are at least one of each: Linac, brachytherapy unit, CT simulator, treatment planning computer and dosimetry/quality assurance package.

Table D: Radiation Therapy Staff needed for Bolivia's two most populous cities based on 2010 population estimates (<http://citypopulation.de/>) and 2008 Globocan data for new cancer cases (<http://globocan.iarc.fr/>).

	New Cancer Cases	Radiation / Clinical Oncologists	Radiation Therapy Technicians	Medical Physicists	Linac Engineers	Radiation Oncology Nurses
Santa Cruz	1449	8	10	4	2 <sup>†</sup>	4
El Alto	855	5	6	2	2 <sup>†</sup>	2

<sup>†</sup>At least 2 are needed in each city.

Table E: Radiation Therapy Equipment needed for Bolivia's two most populous cities based on 2010 population estimates (<http://citypopulation.de/>) and 2008 Globocan data for new cancer cases (<http://globocan.iarc.fr/>).

	New Cancer Cases	Linac / Co 60 Megavolt Unit	Brachytherapy Units	CT Simulators	Treatment Planning Computers	Dosimetry /QA Packages
Santa Cruz	1449	2	1	1	1	1
El Alto	855	1	1	1	1	1

**NOTE:** Guidelines from the IAEA of the United Nations were used to calculate the radiation therapy equipment and staff needed in the setting of a developing Bolivia. Guidelines from the Oncology Nursing Society were used to calculate the number of nurses needed. Several other specialty societies were also requested to provide guidelines but in most cases there were none, therefore colleagues active in those fields were consulted for estimating the number of staff needed.